ORIGINAL ARTICLE

Evaluation of Comprehensive Management Protocol for Reduction of the Risk of Fragility Fractures Among Osteoporosis Individuals, Visiting Teaching Hospital, Kolkata

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ABSTRACT

Introduction: Fragility fracture from osteoporosis is a major challenging health problem in aging population in developing countries. In order to reduce the risk of development of osteoporotic fragility fractures authors made a study with high risk individuals, divided into two groups and a comprehensive management protocol had been offered in one group where as conventional management protocol had been offered in other to see the efficacy of such comprehensive management protocol to reduce the risk of occurring fragility fracture over at least three months period among the patients, attended in orthopaedic out patient department of state medical college, West Bengal. **Methods:** The authors selected 30 diagnosed osteoporosis clients of 50 to 90 years age as per inclusion and exclusion criteria, who attended in orthopaedic OPD in SSKM Hospital, Kolkata, West Bengal, India from 2021April to July2021, carrying highest risk factors of developing osteoporosis. **Results:** In experimental group, mean post test BMD score is higher than the mean pre test BMD, which is statistically significant as calculated t value is 3.666 at 14 df at 0.05 ($p<0.05$) level of significances. It indicates that comprehensive management protocol is effective to increase the bone strength. **Conclusion:** The study of comparison of mean difference values of two groups conclude that comprehensive management protocol can reduce the risk of osteoporotic fracture much efficiently in compared to standard pharmaceutical treatment in a short span of time which is applicable for long term management of osteoporosis.
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INTRODUCTION

Worldwide, osteoporosis causes more than 8.9 million fracture annually, resulting in an Osteoporotic/ fragility fracture in every 3 seconds (1). 1 in 3 women over age 50 (Perimenopausal age) has been experience fragility fractures (2,3). Such fracture commonly occurs in forearm, humerus, hip and spine; resulting in challenging situation for the management with huge financial burden for person, family and the society. About 50 million people in India are either osteoporotic (T- score lower than -2.5) or have low bone mass (T- score between –1.0 to -2.5) (4). There is standard recommendation of medical management of osteoporosis worldwide (5), but still there is occurrence of fragility fracture even after such treatment (6). There is minimal study in the world literature showing addition of nonpharmacological therapies along with medical management in an attempt to reduce the occurrence of fragility fracture (7,8). Therefore, we selected osteoporotic patients in our society and offered Comprehensive management (combined pharmacological and nonpharmacological management) and tried to find out their efficacy over only pharmacological management to reduce the risk of fragility fracture.

MATERIALS AND METHODS

We have selected 30 diagnosed osteoporotic patients as per inclusion and exclusion criteria, of 40 to55 years age who attended in orthopaedic OPD in SSKM Hospital, Kolkata, West Bengal, India, from April 2021to July 2021(Table I), who were divided into two group of 15 eachby Block randomized sampling technique, one experimental and another were control group. During sample selection, emphasis was imposed on minimal educational qualification of selected patients who were willing to participate in the study, able to read or write English and Bengali. Purpose of the study was

explained to the subjects. Informed consent was taken for final data collection from participants. Separate code number was given to each selected individual. At first the structured interview schedule was administered to collect the demographic information. Then the physical examination proforma was used to assess the height, weight & BMI of the participants. Their BMD level was assessed by bone densitometry and then calculated the 5yrs hip fractures risk and 10yrs any other fracture risk by the use of online Garvan Tool (9). Then comprehensive managements protocol was provided to clients of experimental groups and standard conventional medical managements by the treating clinician to the control group. The clients of both groups were re assessed clinically and estimation of BMD at interval of 3 months. Then the post interventional fractures risk was calculated by same Garvan tool and compared with the pre intervention status.

This research work was approved by IPGME & R Research Oversight committee from Institute of Postgraduate Medical Education and research, West Bengal, Kolkata, (Memo no: IPGME&R/IEC/2019/374) dated 17th May 2019.

RESULTS

In experimental group majority were in the age group 51 to 60 years (46.66%), 60% is standard V to X class passed and 73.33% were house wife (Table I) . The authors analysed the paired t test of the meanpre-testand post-test of Hip fracture and any other fracture risk score (At 5 years &10 years) of control and experimental group is described in Table II, III, & IV. In control group, there are neither significant differences in BMD level, nor in pre-test & post test Hip fracture risk and any other fracture risk in (5yrs & 10yrs) at 0.05 level of significances. All table showed that the calculated t value at 0.05 level of significance, of experimental group remain higher than the table value, whereas the calculated t value of control group is less than table value, suggesting that comprehensive management is much effective than standard pharmaceutical treatment which is statistically significant at 0.05 significance. Finally, the unpaired t test result (Table IV) also shows that mean BMD in the experimental group is higher than the mean BMD Score of control group, as the calculated t value is 2.324 at 28df at 0.05 level of significance($p<0.05$) is higher than table value (2.05) indicating that the comprehensive managements protocol is effective to reduce the risk of osteoporotic fractures, compared to standard pharmaceutical treatment.

Table I: Frequency & percentage distribution of osteoporotic patients

Variable	Control Group (n = 15)		Experimental Group (n = 15)	
	Frequency	Percentage	Frequency	Percentage
Male	6	40%	1	6.666%
Female	9	60%	14	93.33%
Age				
40 – 50	1	6.666%	—	—
51 – 60	8	53.333%	7	46.66%
61 – 70	5	33.33%	6	40%
71 – 80	1	6.67%	2	13.34%
81 – 90	—	—	—	—
Education				
I – V	—	—	—	—
V – X	4	26.66%	9	60%
XI – XII	4	26.66%	2	13.33%
Graduate	6	40%	4	26.67%
Post Graduate	1	6.66%	—	—
Occupation				
Housewife	7	46.66%	11	73.33%
Business	3	20%	4	26.67%
Service	4	26.66%	—	—
Retired	1	6.66%	—	—
Marital Status				
Married	14	93.33%	12	80%
Unmarried	—	—	2	13.33%
Widow	1	6.67%	1	6.66%
Transgender	—	—	—	—
Religion				
Hindu	14	93.33%	12	80%
Muslim	1	6.67%	3	20%
Christian	—	—	—	—
Other	—	—	—	—

Data presented in table I: depicting that male 40% & female 60 %in control group and male 6.66% & female 93.33% in experimental group. Majority of the age group in control & experimental group respectively (53.33%)&(46.66%) is belong (51-60yrs) .Majority of the education level in control & experimental group respectively (40%)& 60%) are graduate. Majority of the occupational status in control & experimental group respectively (46.66%)&(73.33%) are house wife. Majority of the marital status in control & experimental group respectively (93.33%)&(80%) are married Majority of the religion status in control & experimental group respectively (93.33%)&(80%) are Hindu.

Table II: Analysis of Paired't' test of Control group and Experimental Group of pre-test & post test score of 5years & 10 years Hip fracture risk

	5 Years			
	Control group		Experimental Group	
	Pre test	Post test	Pre test	Post test
Mean	2.7667	1.5467	1.9267	4.667
SD	3.44791	11.5873	1.10631	4.25721
t value	1.881	1.881	2.973	2.973
	10 Years			
	Control group		Experimental Group	
	Pre test	Post test	Pre test	Post test
Mean	5.333	3.2667	6.4233	8.533
SD	6.34335	2.25093	2.077	7.614
t value	1.793	1.793	3.174	3.174

(At df = 14 at 0.05 level of significance the Table value is 2.145)
Table II shows that in 5 years case calculated t value at 0.05 level of significance, of experimental group (2.973) is higher than the table value, whereas the calculated t value (1.88) of control group is less than table value and shows that in 10 years case calculated t value at 0.05 level of significance, of experimental group (3.174) is higher than the table value, whereas the calculated t value (1.793) of control group is less than table value.

DISCUSSION

Osteoporosis is a common systemic disease or skeletal disorder (10,11). Worldwide, osteoporosis causes millions fracture annually, resulting in an Osteoporotic/fragility fracture (12,13). Osteoporosis is a worldwide prevalent disease like silent epidemic which poses multi folded problems when present with fragility fractures in spite of standard pharmaceutical treatment. But it is seen several external factors like low muscle mass (Sarcopenia), unhealthy environment as well as lifestyle lead to lack of postural balance and trivial fall which contribute to fracture of fragile

Table III: Analysis of Paired't' test of Control group and Experimental Group of pre-test & post test score of 5years & 10 years Hip fracture risk

5 Years				
	Control group		**Experimental Group**	
	Pre test	Post test	Pre test	Post test
Mean	8.886	6.067	7.7333	12.466
SD	7.472	2.987	2.737	6.653
t value	1.979	1.979	4.198	4.198
10 Years				
	Control group		**Experimental Group**	
	Pre test	Post test	Pre test	Post test
Mean	13.933	12.266	15.866	24.333
SD	9.720	5.8244	5.3657	11.678
t value	0.740	0.740	4.505	4.505

Table III shows that in 5 years case calculated t value at 0.05 level of significance, of experimental group (4.198) is higher than the table value, whereas the calculated t value (1.979) of control group is less than table value and in 10 years case calculated t value at 0.05 level of significance, of experimental group (4.505) is higher than the table value, whereas the calculated t value (0.740) of control group is less than table value.

Table IV: Unpaired 't' test of Experimental Group & Control Group of BMD

Parameter	Group	Mean	SD	't' value	df	'p' value
BMD	Control Experimental	2.48 2.56	0.56 0.83	2.324*	28	0.28

(At df = 28 at 0.05 level of significance the Table value is 2.05)
Table IV shows that calculated t value at 0.05 level of significance, is higher than table value which is statistically significant, indicating the comprehensive management protocol is effective to reduce fracture risk in comparison to standard pharmaceutical treatment.

osteoporotic bone, resulting from unhealthy diet, poor in calcium and Vitamin D. Therefore, they attempted to add that nonpharmacological management in addition to standard pharmacological treatment (Comprehensive management) for management of osteoporosis and reduction of fragility fracture. Among nonpharmacological management, they emphasized on muscle building as well as balance improving exercises which can reduce the tendency of fall, the diet rich in calcium and vitamin D and other nutrients which can increase the strength of bone and muscles, modification of environments like addition of side rods or grab bar in toilet and staircase for taking support for reduction of fall, provision of enlightment in corridors, toilet, staircase, removal of rugs or smoot tiles from the floor, etc and lifestyle modification like use of proper walking aids, furniture of adequate height for taking rest, sitting, lying, avoidance of smoking excessive alcohol etc. The authors selected established osteoporotic individuals, diagnosed by clinicians, divided into two groups by randomized sampling technique for reduction of bias, upon which the efficacy of comprehensive management over standard pharmacological treatment was tested with pretest posttest quasi-experimental study with standard parameters like BMD and online Garvan tool which can calculate the probability of hip and general fracture in coming five and ten future years. They selected Garvan tool which can calculate the fracture risk efficiently without DEXA scan which is expensive and outside the access of majority of poor osteoporotic patients of our society. The statistical analysis clearly showed the improvement of BMD as well as reduction of fracture (Hip and general fracture) risk in experimental group received comprehensive management, compared to control group, received only pharmacological treatment with significant level of 0.05.

CONCLUSION

In the present study statistical analysis clearly demonstrated that the experimental group received comprehensive management and had a lower risk of fracture (Hip and general fracture) than the control group, which only received pharmacological treatment. The short-term study showed that a comprehensive management protocol outperformed standard pharmacological treatment in reducing future (5 and 10-year) fracture risk; it can be used for long-term osteoporosis management with the goal of reducing fragility fractures in our society.

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